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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/776,672	02/11/2004	Elizabeth G. Pavel	7608	3482
55649	7590	08/28/2006		
MOSER IP LAW GROUP / APPLIED MATERIALS, INC. 1040 BROAD STREET 2ND FLOOR SHREWSBURY, NJ 07702				
			EXAMINER TRAN, BINH X	
			ART UNIT 1765	PAPER NUMBER

DATE MAILED: 08/28/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/776,672	Applicant(s) PAVEL ET AL.	
	Examiner Binh X. Tran	Art Unit 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,6,7,9,10,13-17,21,22,26,28 and 30-40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,6,7,9,10,13-17,21,22,26,28 and 30-40 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. The examiner decides to withdraw the previous allowance subject matter due to the new found prior art (Smith, Jr. et al. US 6,419,801).

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).
4. Claims 1, 7, 9-10, 15-16, 21-22, 26, 28, 30-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishihara (US 2001/0027023 A1) in view of Smith Jr. et al. (US 6,419,801).

Respect to claims 1 and 16, Ishihara discloses a method for removing/etching photoresist layer (organic layer, paragraph 0116) comprising the step of:

position the substrate comprising a photoresist layer into a processing chamber
(See Fig 1);

removing the photoresist layer using a plasma (paragraph 0119-0135);
monitoring the plasma for hydrogen optical emission, CO optical emission, oxygen
optical emission during the process (paragraph 0135-0136).

terminate the removing process according to the intensity result of emission peak
wavelength of oxygen, hydrogen (paragraph 0135-136, read on "stopping the etching
upon either the hydrogen optical emission obtaining a first level or the oxygen optical
emission obtaining a second level, or both").

Ishihara does not explicitly disclose monitoring the plasma for both hydrogen
and oxygen optical emission. However, Ishihara clearly measure the intensity of light
emission of hydrogen, oxygen, CO, or the like (paragraph 136). In paragraph 135,
Ishihara discloses the monitoring the emission of CO and hydrogen, or oxygen (O) and
using the information from the monitoring to control the switching time. Smith teaches
to monitor the optical emissions of the plasma at plurality of wavelength between 250
nm and 1,000 nm in order to evaluate the endpoint and the progression of the plasma
recipe (col. 37-38, Fig 18-20, col. 57-58). It would have been obvious to one having
ordinary skill in the art, at the time of invention, to modify Ishihara in view of Smith by
monitoring plurality of optical emission including both hydrogen and oxygen emission
because this will result in a more accurate endpoint and help us to evaluate the
progression of the plasma recipe. Further, Ishihara clearly disclose it is possible to

Art Unit: 1765

monitor plurality of emission at the same time in order to control the endpoint (i.e. switching time).

Respect to claim 35, Ishihara discloses a method for removing/etching photoresist layer (organic layer, paragraph 0116) comprising the step of:

position the substrate comprising a photoresist layer into a processing chamber (See Fig 1);

etching the photoresist layer using a plasma (paragraph 0119-0135);
monitoring the plasma for at least one optical emission while etching (i.e. hydrogen optical emission, CO optical emission, oxygen optical emission during the process; paragraph 0135-0136).

Respect to claim 1, 16 and 35, Ishihara fails to disclose the step of determining from at least one of the monitored optical emissions whether a cleaning cycle is necessary, whether components within the chamber are degrading, or both. Smith teaches to use the monitored optical emissions to determine whether to chamber need cleaning process or not.(col. 28 lines 1-61). According to Smith, a determination is made as to whether the interior of the chamber is "dirty" to warrant cleaning the chamber. It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Ishihara in view of Smith to determine from the monitored optical emissions whether the cleaning cycle is necessary or the component within chamber are degraded (i.e. dirty) because cleaning the chamber help to reduce residues formed on the semiconductor wafer during the plasma process.

Respect to claims 7, 21 and 36, Ishihara teaches to monitor the hydrogen optical emission occurs at a wavelength of about 656 nm while etching (paragraph 0136).

Respect to claims 9, 22 and 37, Ishihara discloses to monitor the oxygen optical emission occurs at a wavelength of about 777 nm while etching (paragraph 0136). The limitation of claim 38 has been discussed above. Respect to claim 10, Ishihara discloses stopping the etching upon the hydrogen optical emission obtaining a predetermined level (paragraph 135-136)

Respect to claims 15 and 26, Ishihara discloses the emission peak of hydrogen and emission peak of oxygen depend on hydrogen atoms and oxygen atoms. The concentration of hydrogen and oxygen atoms is depended on the input flow rate for each individual gas with respect to each other. Since the flow rate of hydrogen can be correlated with the flow rate of oxygen. Therefore, the hydrogen optical emission must be correlated with the oxygen optical emission.

Respect to claim 28, 30, Smith teaches to comparing the monitored optical emissions of a "healthy" plasma chamber in order to determine whether the chamber is in condition for cleaning (e.g. "dirty/unhealthy" plasma condition) (See col. 81, read on "comparing the monitored optical emissions to a fingerprint of a clean chamber"). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Ishihara in view of Smith by comparing the optical emission to the finger print of a clean chamber (i.e. "healthy plasma chamber") because it help us to determine when the chamber is need to clean.

Respect to claims 31, 33, 39 Smith teaches to determine the plasma heat module (Fig 7, read on "condition of plasma source"). Respect to claims 32, 34, 40, Smith teaches to determine the condition of the interior of the processing chamber (col. 28 lines 4-19, read on "inner surface of the processing chamber").

5. Claims 2, 6, 13-14, 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishihara and Smith and further in view of Hallock et al. (US 2002/0151156).

Respect to claims 2 and 17, Ishihara and Smith fail to disclose the photoresist layer comprises a harden crust layer. However, Ishihara clearly teaches to implant ion such as boron, phosphorous, arsenic into the photoresist layer. Hallock teaches implant boron, phosphorous or arsenic ion to form a harden crust layer (paragraph 0018). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Ishihara and Smith in view of Hallock by having a harden crust layer because it will prevent ion from penetrating into the surface of the substrate.

Respect to claims 6, 13-14, Hallock discloses the optical emission having first level during etching and second level after the crust is removed and third after the photoresist is removed (Fig 2-3).

Response to Arguments

6. The examiner decides to withdraw the previous ground of rejections based on the new prior art (Smith Jr. et al US 6,419,801). A new ground of rejection was made using Smith as one of the prior arts as discussed above.

Conclusion

Art Unit: 1765

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Binh X. Tran whose telephone number is (571) 272-1469. The examiner can normally be reached on Monday-Thursday and every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Binh X. Tran